

PHILOSOPHICAL TRANSACTIONS.

August 16. 1669.

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An Invention

For Estimating the Weight of Water in Water with ordinary Ballances and Weights.

THe Author of this Invention is the Noble *Robert Boyle*; who was pleas'd to comply with our desires of communicating it in English to the Curious in *England*, as by inserting the same in the *Latin* Translation of his *Hydrostatical Paradoxes*

he hath gratified the Ingenious *abroad*. And it will doubtless be the more welcome; for as much as no body, we know of, hath so much as attempted to determine, *How much* Water may weigh in Water; and possibly if such a *Problem* had been propos'd, it would have been Judged impracticable.

The Method or Expedient, he made use of to perform it as near as he could, may be easily learned by the ensuing account of a Tryall or two, he made for that purpose, which among his Notes he caused to be registred in the following words.

A Glass-bubble of about the bigness of a pullets-egg was purposely blown at the flame of a Lamp, with a somewhat long stem turn'd up at the end, that it might the more conveniently be broken off. This Buble being well heated to rarify the Air, and thereby drive out a good part of it, was nimbly sealed at the end, and by the help of the figure of the stem was by a convenient Weight of Lead depressed under water, the Lead and Glass being tyed by a string to one Scale of a good Ballance, in whose other there was put so much weight, as sufficed to counterpoise the Buble, as it hung freely in the midst of the water. Then with a long Iron *forceps* I carefully broke off the seal'd end of the Buble under water, so as no Buble of Air appear'd to emerge or escape through the water; but the liquor by the weight of the Atmosphere sprung into the un-replenisht part of the Glass-buble, and fill'd the whole cavity about half full; and presently, as I foresaid, the Buble subsided and made the Scale, it was fastned to, preponderate so much, that there needed 4. *drachms* and 38. *graines* to reduce the Ballance to an *Equilibrium*. Then taking out the Buble with the water in't, we did, by the help of the flame of a candle, warily apply'd, drive out the water (which otherwise is not easily excluded at a very narrow stem) into a Glass counterpoised before; and we found it, as we expected, to weigh about 4 *dramchs* and 30 *graines*, besides some little that remained in the Egg, and some small matter that may have been rarified into vapors, which added to the piece of Glass that was broken off under water and lost there, might very well amount to 7. or 8. *graines*. By which it appears not only, that water hath some weight in water, but that

* This expression was added, to leave Liberty for a further inquiry, whether the Experiment, which hereby appears convincing as to the main thing intended to be proved, may not admit the having something further debated, and annex about some circumstantial thing or other.

it weighs very near * or altogether as much in Water, as the self same portion of liquor would weigh in the Air.

The same day werepeated the Experiment with another sealed Buble, larger then the former (being as bigg as a great Hen-egg,) and having broken this under water, it grew heavier by 7. drachms and 34. graines; and having taken out the Buble, and driven out the water into a

counterpois'd Glass, we found the transvafated liquor to amount to the same weight, abating 6 or 7 graines, which it might well have lost upon such acccompts, as have been newly mentioned.

An Extract of a Letter

Written by Mr. Joshua Childrey to the Publisher, containing an Account of a passage by sea to the East-Indies, communicated to him by that Ingenious Travailer Mr. Richard Smithson Who made two voyages into those parts.

From *England* to *Cape Finis Terra* in *Gallicia* in 44. degr. *North Lat.* the Winds are as variable as with *Vs*; onely the *Bay* or *Biscay* is more subject to storms, and the Sea more rough, and the Waves running very high.

From thence to 34. degr. The Wind is variable also, but if you be within 100 leagues of the *European Continent*, it is generally inclined to *North-East*

From 34 degrees, if you be inclining to the coast of *Africa*, or about the Meridian of the *Canaries*, the Wind is so certain, and constantly at *North-East* (or within two points) that it is rare to find it otherwise. Yet in Winter, upon the coast of *Africa* there are sometimes Westerly storms, that are violent, but of no long continuance. And in Summer, when it is sometimes calme, the Air will come variably. These *North-East-Winds* hold most commonly to 8. degrees *North-Latitude*, and then begin the *Tornado Winds*, which are most part confined between 8. and 4. degrees *North-Latitude*. They are sel-